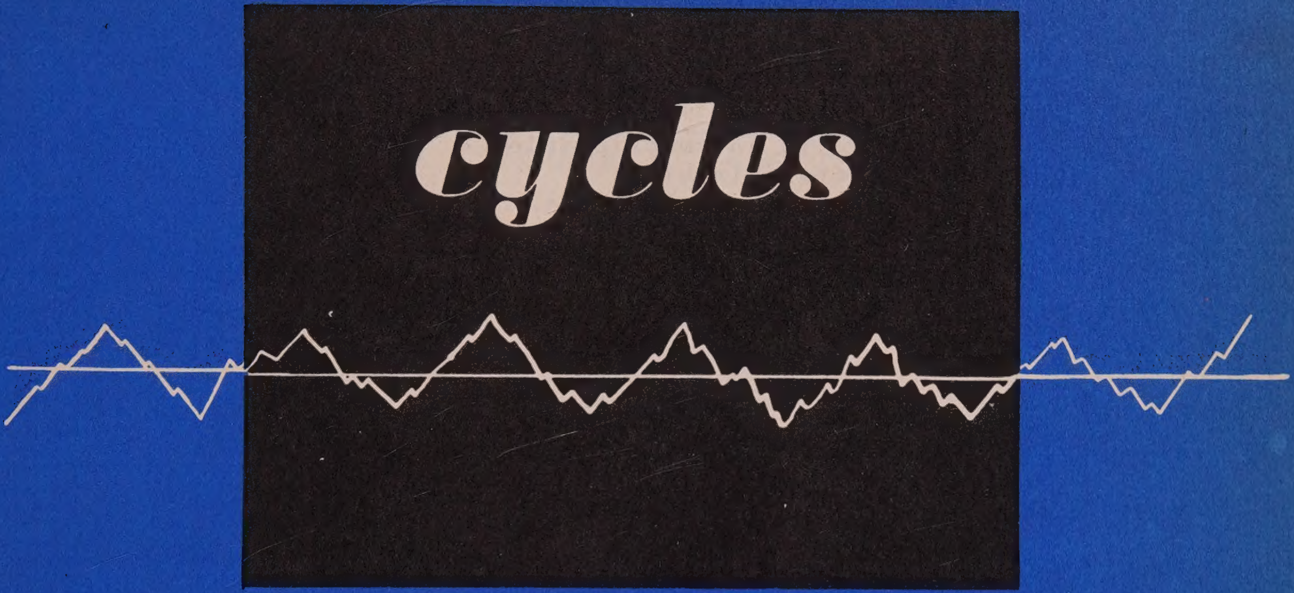
cycles



August—September 1954

FOUNDATION FOR THE STUDY OF CYCLES
New York, New York

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cycles

The official Bulletin of the Foundation for the Study of Cycles

VOLUME V NUMBER 7 AUGUST—SEPTEMBER 1954

The Director's Letter

Dear Member:

A Forecast

I look for better business during the rest of the year.

More specifically, I look for the Federal Reserve Index of Industrial Production, seasonally adjusted, to advance for the next few months.

But, as I said in our May 1954 report, I do not think the "depression" is over. If the coming advance in business outtops the peak of May 1953 I shall be surprised.

If business does improve during the next few months it will bear out what I told you in our report for last February, namely, that "any depression in the immediate future is likely to be relatively minor."

The Geisinger Industrial Production Indicator

I hope you like the Geisinger Industrial Production Indicator printed for you on pages 254 and 255 of this report. For as far back as it has been tested it turns about nine months ahead of the Federal Reserve Board Index of Industrial Production. Because it turns ahead of the F.R.B. Index, the Indicator throws some light on how business will be about nine months later—if it continues to work!

The Indicator stopped going down in August 1953. Thus, since that time, it has suggested that business would stop going down about May 1954, and that business would then go up for several months. My opinion, expressed above, that industrial production will go up for the next few months, is based in part on the behavior of this indicator.

* * *

Stocks

I do not know any more about the probable future stock market behavior than I told you in our June-July report.

Lots of people think that industrial production and the stock market go up and down together. They do not. Stocks are sometimes above trend when industrial production is below trend, and vice versa. Stocks sometimes go down when industrial production is going up, and vice versa. I'll write an article on the subject for you some day.

* * *

Tests of Significance

The study of cycles has reached the point where it is imperative that we have mathematical tests of significance. We need to know how many times in a hundred or a thousand we could have a given cycle as a result of random forces.

You will have noticed that I often say, "if the cycle continues." Of course there is *always* the chance that a cycle will not continue. There is a chance that you will die tomorrow. It is not likely, but still it is a chance. The difference between your dying and the cycle dying is that the actuaries can tell you, in regard to your dying, just what the chances are. If you are 50, I should imagine the chances are about 1 in 6,900. But with respect to a given cycle—for example, the 9.2-year cycle in pig iron or copper prices—the statisticians are unable to say. Are the chances 1 in 100? Are the chances 1 in 1000? No one knows.

A satisfactory mathematical solution of this problem must be worked out. There are only a few people in the world equipped to tackle it. During the next year, I hope to get one or two of them to try.

If the events of each year were unrelated to the events of the year before and the year after the problem would be simple. But this is not the case. The factors that make business good one year often extend over several years. It is this inter-relationship which, so far, seems to have baffled the mathematiticians

On the other hand, as far as I know, the problem has not yet been proved insoluble—so there is hope.

However, even if the mathematiticians cannot help, we may be able to get some light from homemade methods. You may remember the story of Edison and the mathematitician.

Edison gave this fellow an old-fashioned light bulb and said to him, "Find me the cubic contents of this bulb."

The mathematitician spent several days filling pads of paper with equations and finally came up with an answer.

"That's very good." said Edison, but this is the way I would have done it. He then weighed the bulb, broke off the tip, filled it with water, weighed it again (including the tip). The difference in weight was, of course, the water inside the bulb. It took but a moment to convert this weight of water to cubic contents.

There are many ways to skin a cat.

Cordially yours,

Edward R. Dewey

Director

THE 3.4-YEAR CYCLE IN AUTOMOBILE SALES

FURTHER study of automobile production shows a 3.4-year cycle in these figures. This cycle is present in addition to the 6-year cycle and the 13-year cycle. (I have already told you about the 6- and the 13-year cycles. See articles in the Oct. '50 and Oct. '52 reports.)

As nearly as I can tell from a study of the yearly figures, the 3.4-year cycle tops ideally about the middle of 1899 and every 3.4 years thereafter. It is going down at the present time. Next year all three cycles will be going down.

The 3.4-year cycle in automobile production has a strength of about 109.7% of trend at its top; about 91.2% of trend at its bottom.

You need to know about this cycle in order to get a better idea of what's ahead for automobile production. If we include this cycle in the forecast, the forecast should be better. Also, now that we know about this short cycle we can measure the long cycles better.

I plan to restudy the longer cycles in the near future. I will then project for you a combination of the 3.4-year cycle, the 6-year cycle, and the 13-year cycles. I will also report to you upon any other cycles in automobile production that I can find.

Let me now use two or three paragraphs to explain the charts.

Fig. 1 shows factory sales of passenger automobiles from 1895 through 1953. The thin broken line is a three-year moving average trend of the sales figures. (Each point on the trend line is an average for that year, the year before, and the year after.)

Fig. 2 shows the percentages by which the actual sales are above or below trend. In other words, Fig. 2 is much the same as Fig. 1 would be if we pulled the trend line straight. The broken zigzag line diagrams the 3.4-year cycle. The gap from 1940 to 1947 represents World War II (and one year on each side of it). The curve from 1952 to 1953 is broken because I had to estimate trend for 1953.

Except in 1903 and 1904 and in 1935 the fit is remarkably good. And note how the cycle picks up again after the distortions of the war.

Automobile production is very important for you to know about. In fact Professor Pearson of Cornell tells you merely to ask "How's business?" of your local automobile dealer, haberdasher, and building contractor. You will then have, he says, the most up to date data on the business situation that you can get. He calls this method a more accurate appraisal of business than any number of long distance phone calls to men in New York or Washington who are supposed to know.

I agree with him that automobiles as well as construction and textiles, are very important. So I repeat—watch automobiles. And, next year, if the cycles continue, watch automobile production go down. *E.R.D.*

FIG. 1

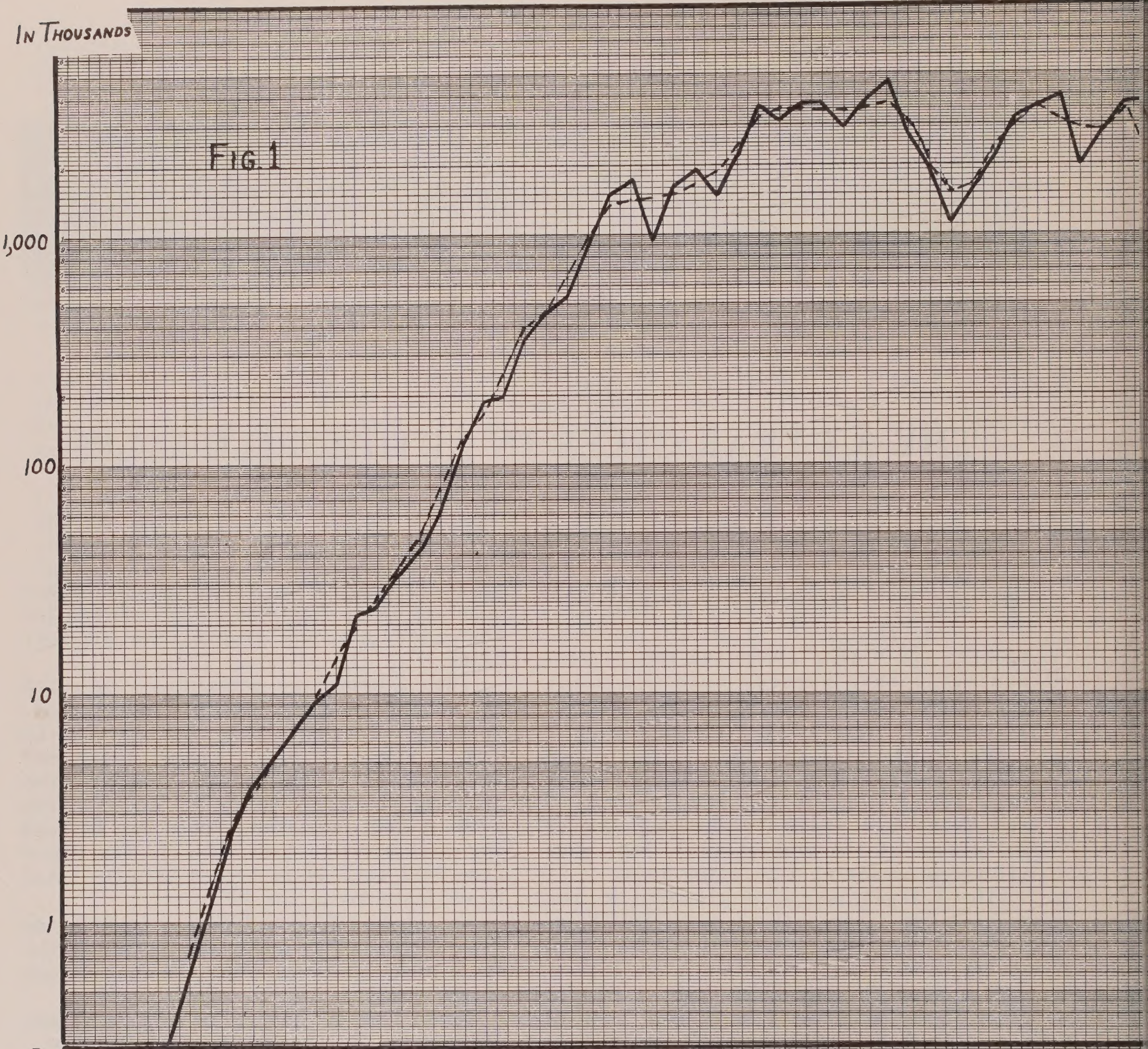
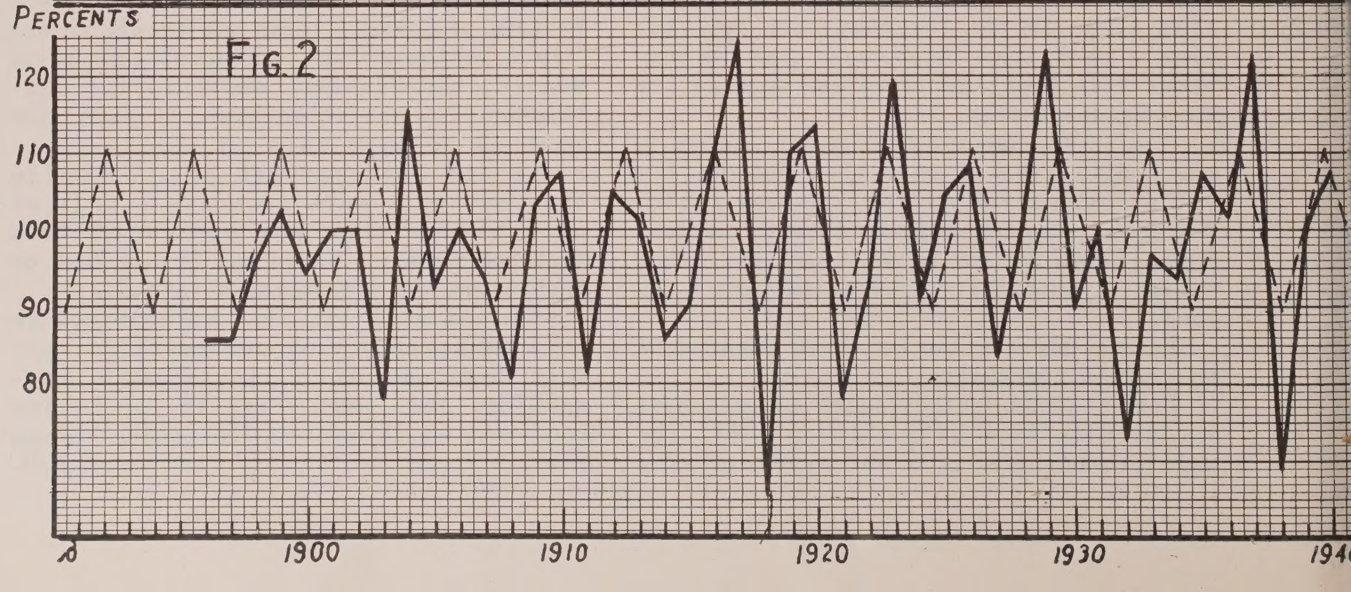

IN THOUSANDS
1,000
100
10
1

FIG. 2


PERCENTS
120
110
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80
1900
1910
1920
1930
194

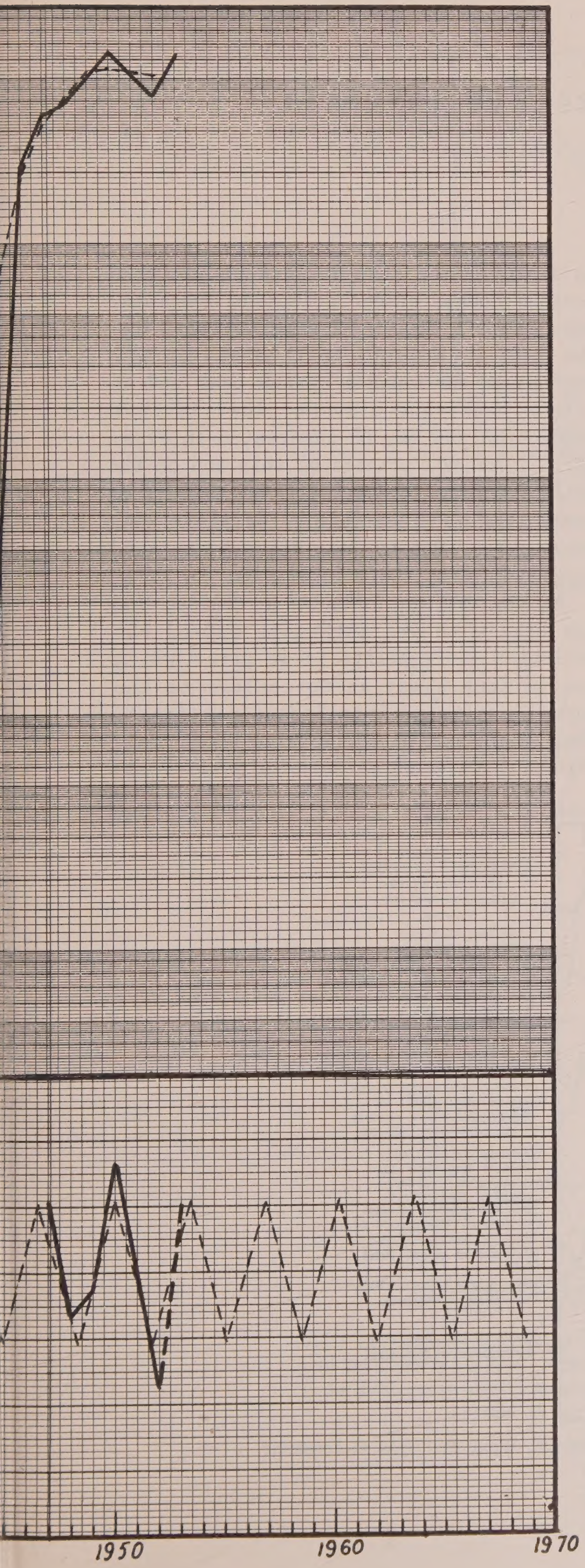


Fig. 1. Factory Sales of Passenger Automobiles 1895—1953. Broken line shows a 3-year moving average trend of these figures. Ratio Scale.

Fig. 2. Percentages that Factory Sales of Passenger Automobiles are of their 3-Year Moving Average Trend.

TABLE 1

MOTOR VEHICLE PRODUCTION, U.S.A. 1893—1953

FACTORY SALES OF PASSENGER CARS

YEAR	No. IN THOUS.	YEAR	No. IN THOUS.
1893	ONE CAR	1926	3,784
1894	?	1927	2,937
1895	.3	1928	3,815
1896	.6	1929	4,587
1897	1.2	1930	2,785
1898	2.4	1931	1,973
1899	3.9	1932	1,135
1900	5	1933	1,574
1901	7	1934	2.178
1902	9	1935	3,252
1903	11	1936	3,670
1904	22	1937	3,916
1905	24	1938	2,001
1906	33	1939	2,867
1907	43	1940	3,717
1908	63	1941	3,780
1909	128	1942	223
1910	181	1943	.1
1911	199	1944	.6
1912	356	1945	70
1913	462	1946	2,149
1914	544	1947	3,558
1915	896	1948	3,909
1916	1,526	1949	5.114
1917	1,746	1950	6,666
1918	943	1951	5 338
1919	1,652	1952	4,321
1920	1,906	1953	6,122
1921	1,468		
1922	2,274		
1923	3,625		
1924	3,186		
1925	3,735		

CYCLES IN INTELLECTUAL INTEREST

(REPRINTED FROM OUR REPORT FOR SEPTEMBER 1950)

If you have just joined the Foundation you may wonder why you have received nothing from us during July and August.

The reason is that experience has shown that there is a definite seasonal pattern to people's intellectual interests. In the summertime folks are simply not interested in things like cycles.

We used to send out material right through the year, but many instances arose where people had no memory of having even seen the releases of the summer months, much less read them. Finally we abandoned the year around mailing practice and limited our mailings to the ten cooler months.

Professor Ellsworth Huntington of Yale, until his death a valued member of our Board of Directors, made extensive studies to discover the seasons when people read serious books, attend scientific meetings, make highest scores on examinations, file the most amendments to patents. In all instances, he found a spring peak and an autumn peak—and a summer low. In this connection you may be interested in Figs. 44, 45, and 46, printed on this and on the following page. These charts are taken from Huntington's **Mainsprings of Civilization**, copyrighted 1945 by John Wiley & Sons and reproduced with their permission.

As you can see from these charts, you are likely to get much more out of our bulletins and reprints if we give them to you in such a way as to conform to the normal cycles of intellectual interest. What is the use of our knowing about these things if we don't do something about it?

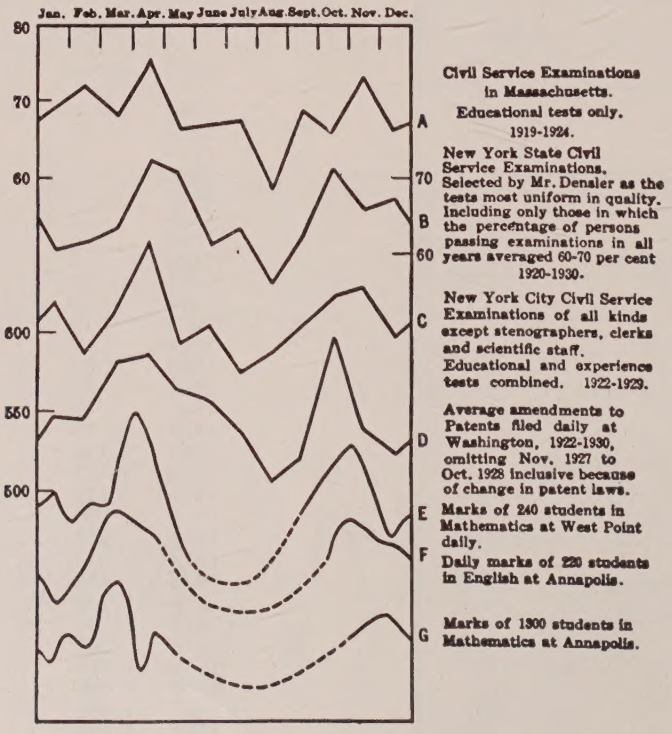


Figure 44. Seasonal Fluctuations in Mental Activity. From *Principles of Economic Geography*.

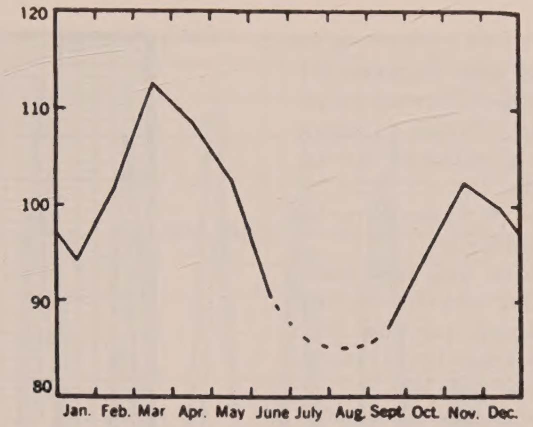


Figure 45. Average Participation in Regular Meetings of Engineering Societies. The curve is based on percentages of the weighted average of (1) The American Institute of Chemical Engineers, New York, 1893–1912, with 11.1 participants per meeting; (2) American Society of Civil Engineers, New York, 1893–1921, 4.0 participants; and (3) Western Society of Engineers, Chicago, 1900–18, 7.5 participants.

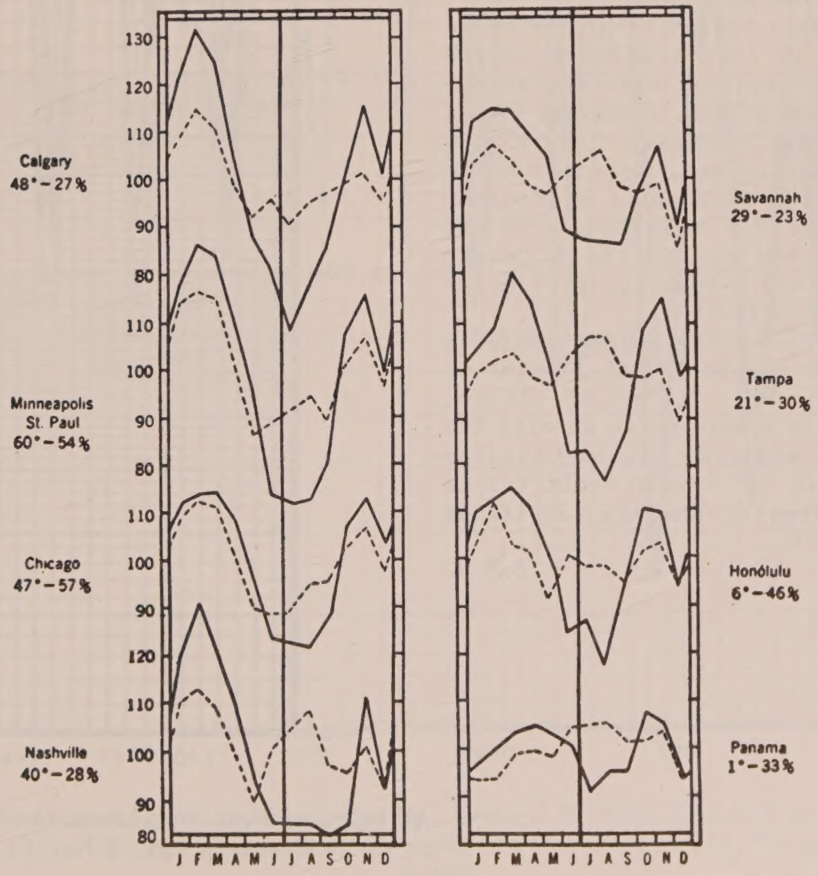


Figure 46. Seasonal Circulation of Fiction (dashed lines) and Non-fiction (solid lines) by Libraries in Eight Urban Centers. Numbers under city names indicate (1) the difference in average temperature between the warmest and coldest months, and (2) the percentage of non-fiction.

THE 9.6-YEAR CYCLE

WE have just received new figures of lynx abundance from the Department of Statistics in Canada. These figures bring the chart of lynx abundance up to date, as nearly as possible.

It is obvious that the 9.6-year cycle in these figures is continuing.

This extraordinary cycle has now continued for more than 220 years. Other mammals in Canada, salmon in the St. Lawrence River, and chinch bugs in Illinois also fluctuate in a 9.6-year cycle.

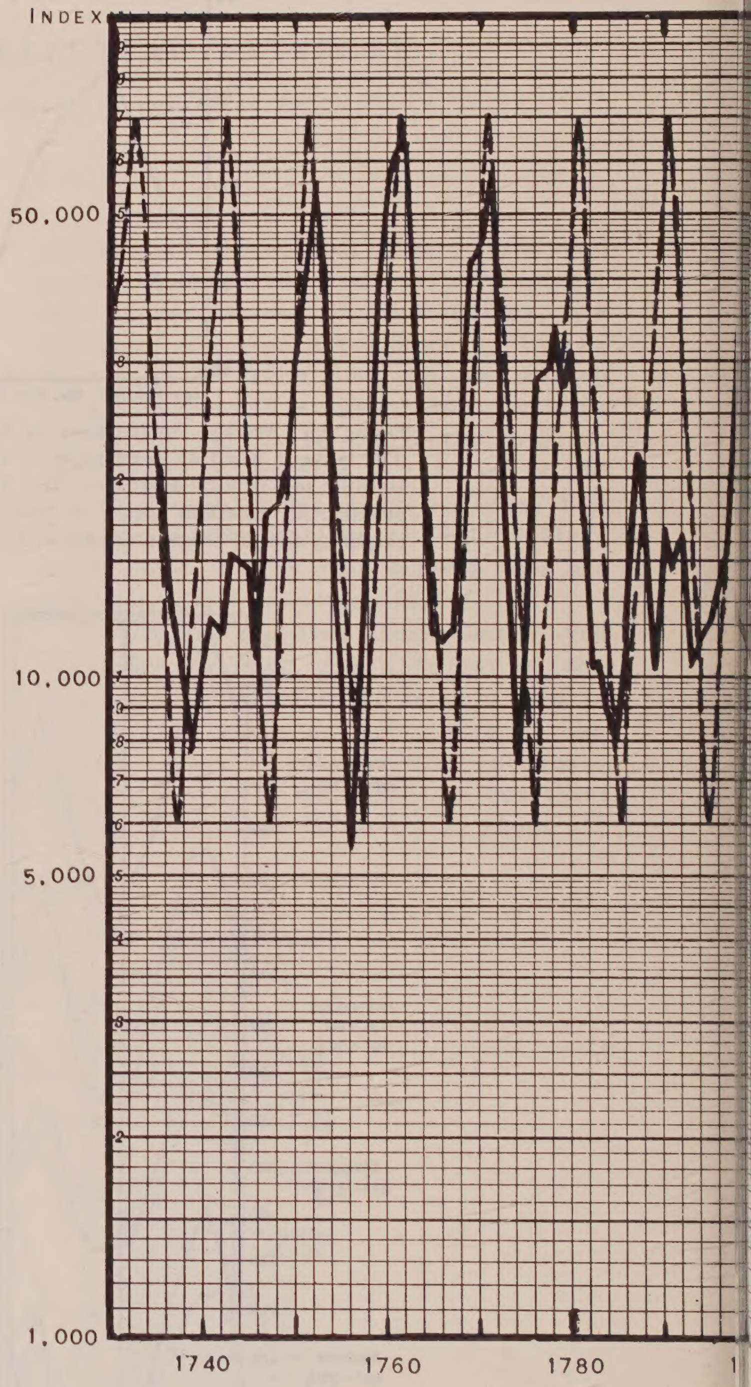
The cause of this cycle in the abundance of lynx and so many other animals is still unknown.

Hints of a cycle of this length have been found in weather and in tree rings. But no evidence of its presence in human affairs, except in heart disease, has ever been found, as far as I know.

Many biologists believe that the cause of this cycle in lynx abundance is the result of a 9.6-year cycle in the abunddance of the varying hare. (Lynx eat hares, among other things.) However, this explanation, even if correct, does not solve anything from the standpoint of cycles. What causes the 9.6-year cycle in the varying hare? And why do the Atlantic Salmon vary in a 9.6-year cycle. I never saw a rabbit eat a fish!

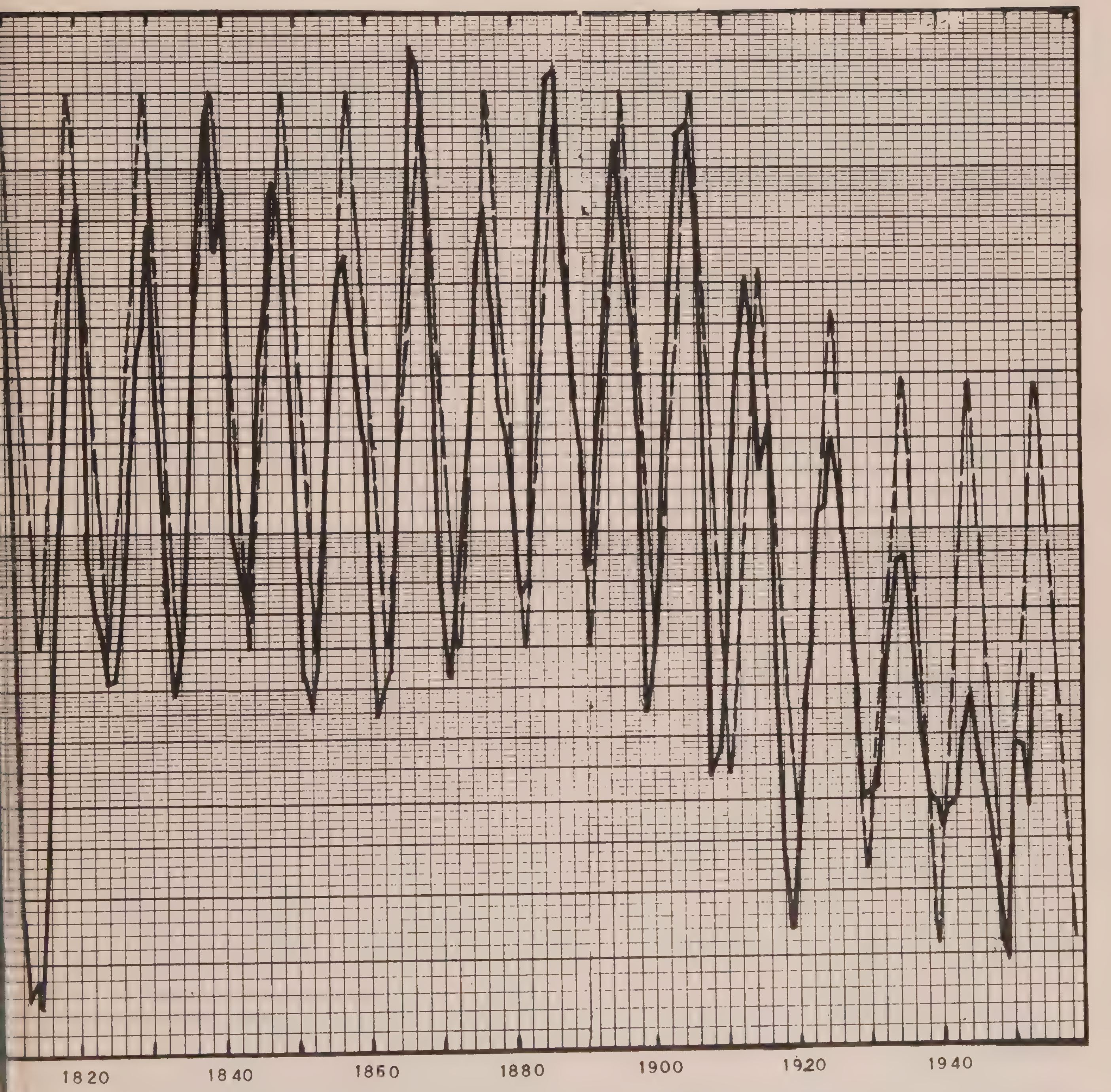
Huntsman believes the Salmon cycle is associated with rainfall (see *Journal of Cycle Research,* Vol. 1, No. 2). If so, rainfall may have something to do with the Lynx cycle. Or whatever causes Canadian rainfall to have a 9.6-year cycle (if it has) may act directly upon the rabbits or the lynx, or both.

E.R.D.



An Index of Lynx Abundance, Outfits 1731-32—1952-53. Th
of Cycle Research Vol. 2 No. 1). It makes adjustment fo

OF LYNX ABUNDANCE,



of lynx abundance was developed from old records by Dr. Leonard W. Wing (see his article in the *Journal*
inuity between 1820 and 1821. Broken zigzag line diagrams the 9.6-year cycle. Ratio scale.

Technical

LIMITED DATA

SUPPOSE, God forbid, you had on hand 100,000 little 10-year old boys. Any 50,000 boys picked at random, would average about the same height—let us say 55 inches.

Now suppose you took 50,000 little boys, hit each on the top of the head with a baseball bat. Hit each one gently of course, but hit him hard enough to raise a goose egg. Now measure again. Suppose you find that the boys you have hit measure 55¼ inches. Immediately you know that the goose eggs average ¼ inch high.

But suppose you had only twenty 10-year old boys. Suppose for hitting you chose ten at random. The ten you hit would not necessarily average ¼ inch bigger. Your sample is so small that a few extra tall or extra short boys who did or did not get hit might throw the average out of kilter.

It is the same with cycle analysis. Your average cycle may be distorted by a few especially large randoms. If your series of figures is long enough, every especially large random will tend to have an especially small random to offset it. The trouble is, the series of figures is generally not long enough.

With few boys or with short series how do you get rid of the excessively large randoms?

The way I have found best is the principle of *limited data*. This is how it works:

Let us assume that the ten boys that you hit average ½ of an inch higher than the 10 unhit boys. You know that this is not the exact height of the goose egg, but it is close enough for a first approximation.

Suppose now your sample contains a boy 57 inches tall. He is so far from average that you *know* he will distort whatever group in which he falls. You *could* throw him out of consideration altogether. However I have found it better—working with controlled figures where I know the answer before I started—to count him, but at a value equal to the average plus about twice the height of the goose egg. Of course if he were extra small you would count him at average *less* about twice the height of the goose egg.

That is, in the example given, the average height is 55 inches. The average goose egg as you get it in preliminary measurements is ½ inch. Twice ½ inch is one inch. Fifty-five inches plus one inch is 56 inches; 55 inches minus 1 inch is 54 inches. Hence all boys over 56 inches you call 56 inches no matter how tall they are. All boys under 54 inches you call 54 inches, no matter how short they are.

This method is not very "scientific" but it works. In the example given, using limited data, you might find the average height of the goose eggs to be 3/8 inches instead of ½ inch as given in the preliminary averaging. The true height of the goose eggs; based on a sample of 50,000 is ¼ inch. Using limited data gets you answers closer to the true average.

In cycle analysis you will often find it helpful to limit all deviations from trend that exceed twice the estimated plus or minus amplitude of your cycle. Thus, if your cycle in the unlimited data extends from 110% of trend down to 90% of trend you limit all values over 120% to 120%; all values under 80% to 80%.

The use of limited data will not wholly dispense with lack of an adequate sample, but it will help. *E.R.D.*

THE GEISINGER

INDUSTRIAL PRODUCTION INDICATOR

A FRIEND of mine, W. B. Geisinger, has developed a very sensitive forecast curve which, for some years now, has been turning several months before the turns in the curve of the Federal Reserve Index of Industrial Production. The forecast curve has thus thrown light on what is going to happen. I think it will interest you. I am publishing it herewith.

The forecast curve suggests improvement in industrial production throughout the rest of the year. It bears out what I told you in our report for February 1954, namely "that any depression in the immediate future is likely to be relatively minor."

Geisinger has worked out his forecast curve back only through 1947. I do not yet know how it would have worked prior to that date. Before we rely too heavily on it we should know. I therefore plan to compute the forecast curve for you for a number of additional years. If it worked as well for the period 1937—1947 as it did for the period 1947—1954 we can place more reliance upon it.

The forecast curve is shown as Curve A in Fig. 1 overleaf. Below it, as Curve B, is the Federal Reserve Board Index of Industrial Production, smoothed by a 3-month moving average. That is, each point on the curve is the average of the index value for that month, the month before, and the month after. The last available value of the index all by itself, unaveraged, is shown as a dot.

It is easy to see that the forecast curve turns about nine months ahead of the actual index.

In Curve C I have plotted the forecast curve advanced by nine months. When plotted this way it more or less corresponds to the movements of industrial production. And of course it extends into the future.

In fairness to Mr. Geisinger I cannot reveal how this forecast curve is prepared, except to say that all the components are to be found in the *Survey of Current Business* and that their manipulation is logical and simple.

The forecast curve uses limited data (see an article on limited data on page of this report). As a result it never goes above +6 or below -6. The forecast curve is thus merely a *directional* indicator. In the past, when the forecast curve has cut the lines +3 or -3 important moves of the Index of Industrial Production have followed. That is why I drew a special line for you at these values.

The forecast curve takes cycles into account, but it is not a cycle projection.

For myself I am quite pleased with the indicator. I feel it supplements what I know about cycles and gives us additional light on the probabilities of the future.

E.R.D.

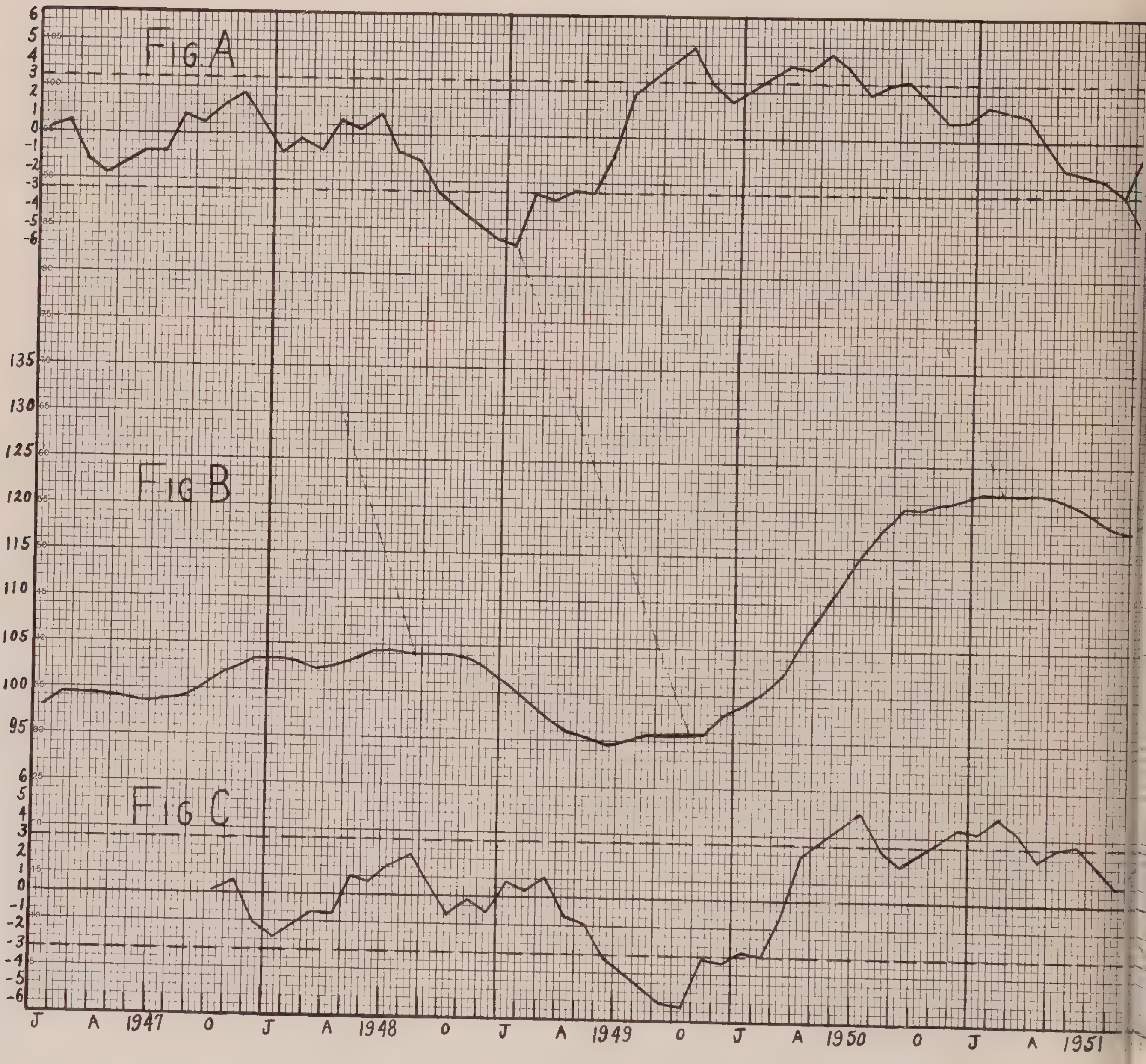
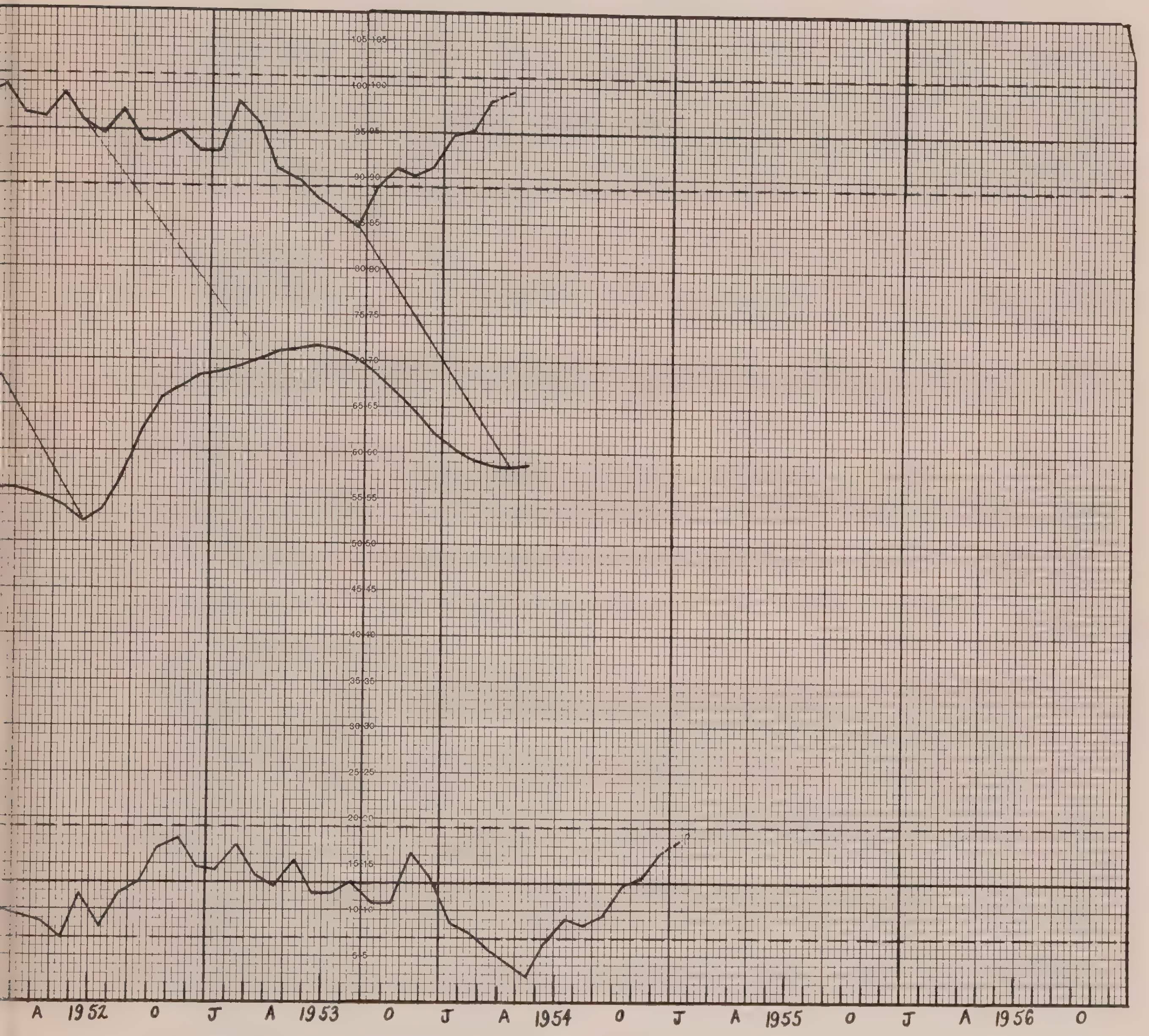


Fig. 1. Curve A. The Geisinger Industrial Production Indicator Curve. This curve is derived from certain figures which are published monthly in the *Survey of Current Business*. It moves between 6 and -6 over the period studied. It tends to turn about 9 months before the Federal Reserve Board Index of Industrial Production.

Curve B. The Federal Reserve Board Index of Industrial Production adjusted for seasonal variation and smoothed by a 3-month moving average. The value for the latest



available month is shown by a dot.

Curve C. This Curve is the Geisinger Industrial Production Indicator Curve advanced by 9 months. This process projects part of the curve into the future. If the relationships of the past continue, the projection gives some hint of what may happen to the Federal Reserve Board Index of Industrial Production (Curve B).

How it Came Out

THE 8-YEAR CYCLE IN CIGARETTE PRODUCTION

As I have told you before (October 1950; November 1952; May 1953), cigarette production is dominated by an 8-year cycle.

My Work of 1949

In March of 1949 I made a study of cigarette production from 1880 through 1947, the latest year for which figures were then available. An 8-year cycle was clearly apparent, especially in the deviations from a 9-year geometric moving average trend.

Any 9-year moving average loses four years at each end. Consequently, in 1949 I was able to plot this cycle in these figures only through 1943. The plot I made at that time is shown by the thin line in Chart 2 below.

To give you perspective I am also printing for you a chart showing actual cigarette production, 1880—1953 (Chart 1). The figures used to make this chart are also printed.

Chart 1 also has a thin broken line to indicate trend. Growth seems to have proceeded in three stages. These are 1880—1901, 1901—1934, 1934 to date. I do not know what caused the two new "rebirths" of this industry. Could it have been (1) the advent of advertising, and (2) smoking by women?

Chart 2 shows you the *percentages* that the actual figures are above and below trend. (The trend used is slightly different from the one used in Chart 1, but this is unimportant.)

Six More Years Available

Figures are now available for the period 1948—1953. These figures enable us to compute six more years of the moving average trend, i.e. through 1949. Now that we have six more years of trend we can compute the percentages that the actual figures are of trend for these six years. This has been done. The results are plotted by means of a heavy line in Chart 2, starting in 1943 and ending in 1949.

We can do even better than that. We can *estimate* trend for the period 1950—1953. We can then compute the percentages that the actual figures are of this estimated trend. This has been done. The results are shown by a heavy broken line.

As you can see, the crest came in 1944, exactly as forecast. The trough came in 1950, two years late. Another crest seems to have come in 1952, exactly as forecast. The next trough is due in 1956.

In my article for October 1950 I said:

Important Upward Force

"The year 1948 was normal timing for a low year of the 8-year wave. If the prevailing pattern continues, 1950, 1951, and 1952 will be subject to an important upward force.

"How can one venture to make such a statement? By relying upon the established fact that where there is regularity there is predictability. For example if, in a given business, the orders for the past six or eight summers have been high, one

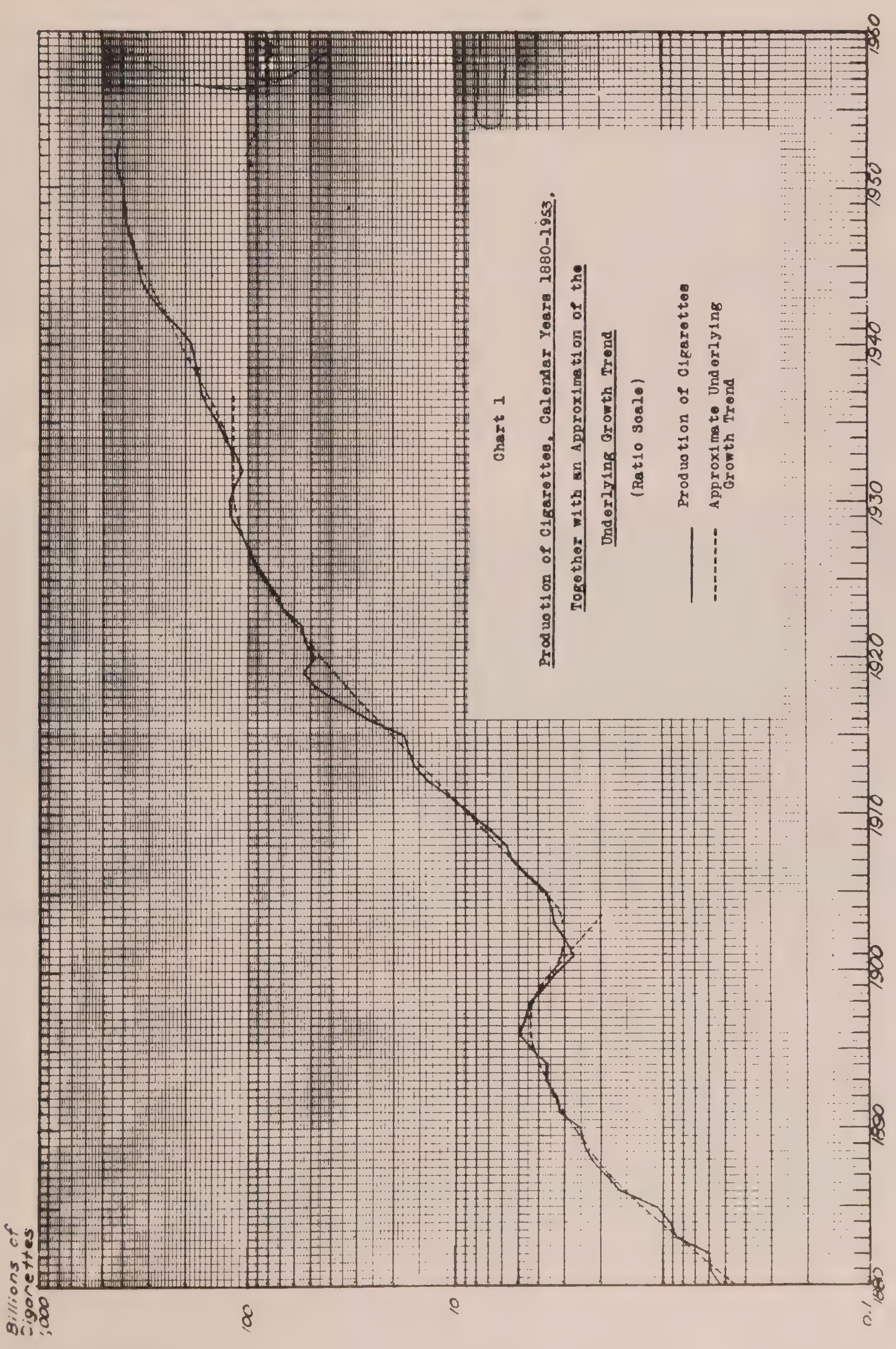


Chart 1

Production of Cigarettes, Calendar Years 1880-1953, Together with an Approximation of the Underlying Growth Trend

(Ratio Scale)

is justified in assuming that orders for this coming summer will probably also be high. At least it would be very foolish to ignore the possibility that business might develop in that way.

8-Year Pattern in Cigarette Production

"You can see definite regularity in the history of cigarette production. The 8-year pattern in these figures has shown up without exception eight times during the past 68 years. Chart 2 not only shows this 8-year pattern clearly, but also shows how it will operate from 1948 to 1960 unless something comes into the picture to break the pattern of two-thirds of a century.

"Chart 2 is based on the percentages that the production figures are of the approximate underlying growth trend. A dotted line indicates a perfectly regular 8-year repetitive pattern. This ideal pattern aids your eye to see deviations from perfect regularity that have been caused by other influences—either other regular patterns, or non-recurring irregularities, or both. The conformity of the pattern to the ideal is noteworthy; it would be even better if the figures had been adjusted for a concurrent 6-year rhythm.

Characteristics of the 8-year Pattern

Study of the curve indicates the possi-

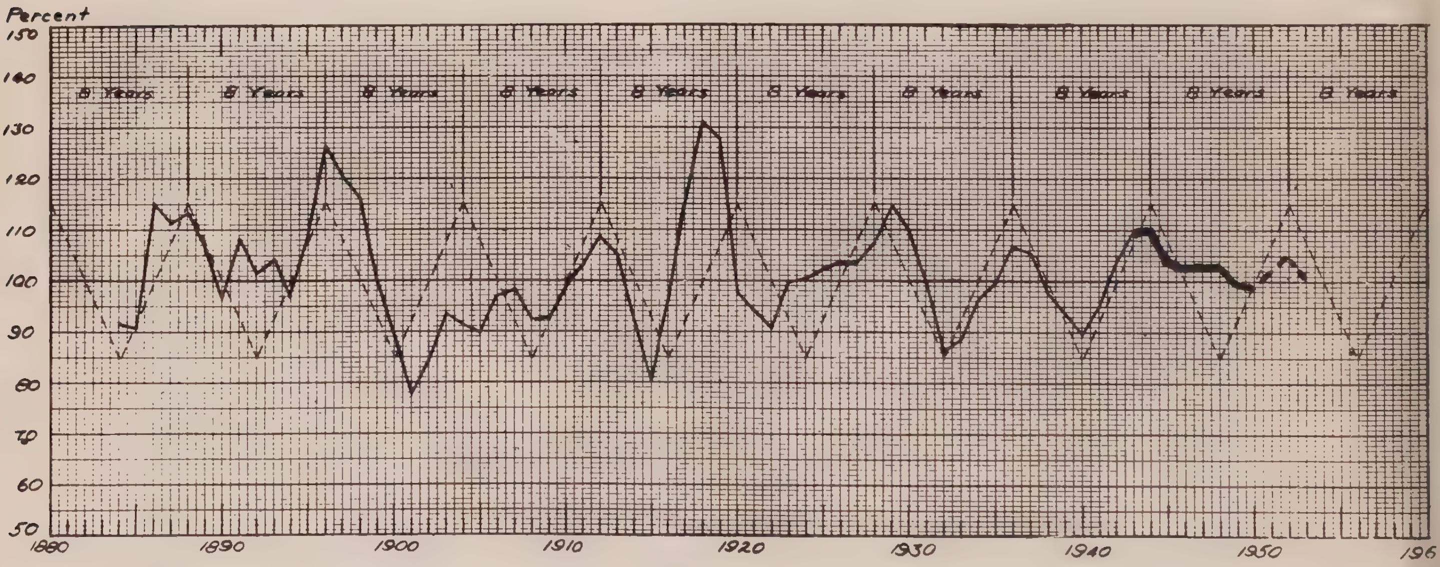


Chart 2

The 8-Year Cycle in Cigarette Production, 1880—1953
After Adjustment for a 9-Year Geometric Moving Average Trend

The 8-year cycle has been added by means of a broken line. This cycle was first determined in 1949 with figures available through 1943 (the 9-year moving average trend loses four years at the end of each series).

The heavy black line, 1943 through 1949, shows how the cycle has unfolded during the six subsequent years.

The heavy broken line, 1949—1953, shows departures from estimated trend. In the future, when trend is known more accurately, these values can be revised.

bility that the waves are a shade longer than 8 years, but for purposes of this memorandum they will continue to be called 8 years long.

“Average behavior of the actual annual figures has been as follows: From a normal year of high, 6.9% above trend, the production figures changed over a 4-year period to a normal year of low, 6.9% below trend, an overall move of 13.8%. This change amounts to a 12.9% decline; a 14.8% rise. Of course, if in these four years trend itself had advanced, say 15 to 20%, there was no actual decline—merely a slowing down in rate of growth.

“Normal years of high for the 8-year pattern are 1888 and every 8 years thereafter, namely, 1896, 1904, 1912, 1920, 1928, 1936, 1944, 1952, 1960, and so forth.

“Normal years of low occur in all instances four years later.

“Out of the 17 highs and lows shown in the chart, 13 have come exactly on time or within one year of perfect timing.”

In my article for November 1952 I said:

“It is interesting to note that we are now, in 1952, at the year of ideal crest. We can expect a decrease in the rate of growth of cigarette production for the four years following.”

Sales for 1953 did in fact turn down, in accordance with expectations. Figures for 1954 are not yet available. After about two more years of decline, relative to trend, cigarette production can be expected to advance again until about 1960.

E.R.D.

TABLE 1

PRODUCTION OF CIGARETTES# U.S.A., 1880—1953

YEAR	PROD. (000,000 OMITTED)	YEAR	PROD. (000,000 OMITTED)	YEAR	PROD. (000,000 OMITTED)	YEAR	PROD. (000,000 OMITTED)	YEAR	PROD. (000,000 OMITTED)
1880	532.7	1896	4,967	1912	13,167	1928	108,710	1944	323,600
1881	594.6	1897	4,632	1913	15,556	1929	122,390	1945	332,200
1882	598.8	1898	4,384	1914	16,856	1930	123,800	1946	350,000
1883	844.0	1899	3,742	1915	17,964	1931	117,100	1947	369,700
1884	920.3	1900	3,254	1916	25,290	1932	106,600	1948	386,800
1885	1,079.5	1901	2,723	1917	35,331	1933	114,900	1949	385,000
1886	1,607.3	1902	2,961	1918	46,657	1934	130,000	1950	392,000
1887	1,865.3	1903	3,360	1919	53,120	1935	140,000	1951	418,800
1888	2,211.9	1904	3,427	1920	47,430	1936	158,900	1952	435,600
1889	2,413.3	1905	3,667	1921	52,090	1937	170,000	1953	* 423,100
1890	2,505.2	1906	4,501	1922	55,760	1938	171,700		
1891	3,137.3	1907	5,256	1923	66,720	1939	180,700		
1892	3,282	1908	5,743	1924	72,710	1940	189,400		
1893	3,661	1909	6,819	1925	82,250	1941	217,900		
1894	3,621	1910	8,644	1926	92,100	1942	257,500		
1895	4,238	1911	10,469	1927	99,810	1943	296,200		

#ALL CIGARETTES PRIOR TO 1898: CIGARETTES WEIGHING LESS THAN 3# PER 1,000. 1898 TO DATE.

*PRELIMINARY

SOURCE: AMERICAN TOBACCO COMPANY AND COLLECTOR OF INTERNAL REVENUE

Letters

Two Theories

Dear Mr. Dewey:

Would the Foundation like two hypotheses on which one or more of its members might like to "go to work?" Proving these would constitute additions to knowledge of great import and benefit. Both involve cyclical behavior—the one within the framework of the "business" cycle and the other within the framework of the bodily structure of the human being? Both have been formulated by responsible persons after long periods of study.

The hypotheses to which I felt you might like to give some thought are, in the one instance, this idea, namely, that the periodicity of the cycles evidenced in the field of production are governed by the useful life of the product produced. This is one. The other is that the periodicity of the cycles which manifest through the movement of the planets is correlated to the rate of changes which take place in the calcium potassium ratio in the human blood stream.

Very sincerely yours,
Norman Dodd

New York 22, New York.

In Reply I Said:

Dear Dr. Dodd:

I appreciate your letter.

The hypothesis that the wave length of the cycles is related to the useful life of the product was first originated, as far as I know, by Tom McNiece of the General Motors Corporation in 1929.

Many examples can be cited in favor of the hypothesis. Many exceptions can also be listed.

The problem would be simpler if each series of production figures had only one inherent cycle. The facts are, however, that each series acts as if it were influenced simultaneously by many cycles.

One of the dominant cycles in the textile field is about two years in length. The dominant cycle of the automobile industry is about six years in length. The most important single cycle in building construction is about 18 years in length. Facts of this sort would tend to back up your hypothesis. On the other hand, textiles and building construction, and automobiles, as well, I think, also show 33- and 41-month cycles and a number of other cycles, some of which are common to all three and still other cycles which each seems to have more or less all to itself.

I think the most that can be said at the present time is that there may be some tendency for the dominant cycle in a series of figures to bear some rough relationship to the length of the life of the product but that the exceptions to the rule are as frequent or more frequent than the conformities.

As for your second hypothesis, I do not happen to know anything about the cycles in the calcium potassium ratio in the human blood stream. I would be very glad to be informed of the wave lengths of the cycles in this ratio as determined by you or others and also to know more of the physiological and phychological effects of the change in this ratio.

Thank you so much for these valuable suggestions. I am sure they will provoke thought and discussion among our members especially if you can let me have some more information in regard to the calcium potassium blood stream cycles.

Very cordially yours,

What is Cooking

Dear Mr. Dewey:

Referring to the December issue and page 346—here are a few comments of my own.

The article on business failures was O. K. Some of us want to learn how to think in addition to being interested in your conclusions.

Of course you understand that our main interest in cycles is to secure some understanding of what is cooking in the world in general and each subscriber in his own field in particular. Our interest is economic rather than on a basis of pure research.

This cycle business must have some chance of showing the subscriber a profit—basically in enabling us to conduct our affairs on a more intelligent level rather than specific tips on some market situation—for me the main trend is the important thing.

In addition to the letter on page 346 I have something of my own.

Your charts are too far behind.

Look, for example, on page 334. The graph and ideal cycle go to 1960 and that is fine. But look at the concrete data—the solid line—it ends in 1943. You are 10 years behind. Surely you can do better than that.

Look over your charts; they are like that more often than not.

You are doing a fine work but remember it must be, to be useful and grow, economically useful, and not just based on a college professor attitude.

Discovering cycles is fine but they must also be put to work.

Thanks for your consideration.

W. G. Crus

Ridgefield, Washington.

In Reply I Said:

Dear Mr. Grus:

Thank you so much for your recent letter and for your helpful suggestion.

I, myself, am quite pleased with the results of my recent work in respect to cycles in manufacturing production. For the first time I feel I am beginning to get some worth-while knowledge of what is ahead for economic activity in this country.

In regard to the charts, when I plot actual figures, I always use the latest available figures. When I show figures above or below trend, it is sometimes impossible to show figures up-to-date because sometimes nobody on earth knows what the trend is at the present time.

For example, take the matter of climate. Was the temperature for last year above or below trend? You do not know and no one else knows because no one knows what the temperature is going to be for the next several years. If it turns out to be very cold from now on, last year's temperature may be above trend. If it turns out very warm, last year's temperature may be below trend.

Of course I could *guess* what trend is, but this would mean that I was guessing the cycle because, by putting the trend up or down, I could make the cycle come out anyway I want it.

I always try to post the original figures as well as percentage of trend figures. You can always look at these to find what things are doing up to the minute.

Ever cordially yours,

156 to 1

Dear Mr. Dewey:

Did you predict the January 1953 top of about 295 D-J Industrials, and the September 1953 bottom of about 255? Followed by the present rally?

Thanking you, I am

R. D. Slater

Salem, Oregon

In Reply I Said:

Dear Mr. Slater:

I have made no stock market projection since early in 1944.

A projection I made at that time, using cycles 4½ years long and longer, has come true over a ten year period with a gain-loss ratio of 156 to 1.

This projection, using as it did only long cycles, did not attempt to forecast month by month moves.

This projection called for a buy in 1944, a sell in 1946, a buy in 1949, a sell in 1952, a buy in 1953, a sell in 1954, and a decline thereafter until 1960..

From a cycle forecast as crude as this, one should read only that now is a time for caution.

Ever cordially yours,

Questions & Answers

Question:

What do you mean by a "reversing cycle"?

Answer:

When a long cycle and a short cycle are simultaneously present in a series of figures, the short cycle rides on the back of the long cycle, each retaining its own characteristics.

On the other hand, when two cycles of about the same length are simultaneously present in a series of figures, they combine to create a false cycle which (if the combining cycles have equal amplitude) has a length half way between the lengths of the two real cycles.

Eventually this false cycle fades out. Later, the false cycle reappears, but in reverse phase.

Because of this fact I call the false cycle a reversing cycle. The causative cycles do not reverse. It is the resulting effect that reverses. The thing that reverses is what Dr. Wing calls the manifest cycle.

The combination of real cycles does cause such an effect, but one cannot argue the reverse. Just because a cycle reverses we cannot assume that it was caused by component cycles slightly longer and slightly shorter, unless there are many repetitions of the reversal. A cycle that reverses *may* be caused by component cycles of nearly the same length, of which case it will reverse again. Or the behavior may be the result of merely internal dynamic factors.

Where a cycle has reversed in the past we are on notice that it may reverse again. Where it has reversed more than once in the past we can determine when it will reverse again if the false reversing length is really the result of cycles slightly longer and shorter.

Question:

Of what use is a chart showing rhythm if deviations are not explained?

Answer:

I do not understand just what you mean.

Perhaps you mean "What is the use of a chart showing rhythm if the reasons for the *rhythm* are not explained."

Prehistoric man did not know the *reason* for the rhythm of the seasons, but he knew the rhythm and I am sure he found this information very valuable. You do not need to know the cause of a rhythm in order to use a knowledge of it.

Perhaps you meant, "Of what use is a chart showing rhythm if the reasons of the deviations or departures from the ideal pattern are not explained.

We do not know why some winters are early and some are late, but a knowledge of the timing of the typical winter is useful in understanding what's ahead for weather, none the less.

Question:

Is the Foundation for the Study of Cycles incorporated?

Answer:

Yes. It was incorporated in 1940 under the laws of the state of Connecticut as a not-for-profit scientific and educational institution.

ERROR

Mr. G. T. Lane of Rochester, New York calls my attention to a typographical error on page 177 of our report for May 1954. The next to the last paragraph should of course read, "**Significance**: If the so-called 41-month cycle in common stock prices has really reversed, this fact introduces an element of weakness, starting in the spring of 1955."

EXCERPTS FROM

CYCLES

THE SCIENCE OF PREDICTION

(CHAPTER XII)

by EDWARD R. DEWEY
Director, Foundation for the Study of Cycles

and EDWIN F. DAKIN
Associate, Foundation for the Study of Cycles

TOGETHER WITH 1954 SUPPLEMENT

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XII

Timing a Business

When we ask what time it is on the clock, we are really asking a spatial question. Its fundamental meaning is: " Where is my spot of earth in reference to the earth's course around its axis and around the sun? " One could plot the answer with a graph. A clock is merely a kind of graph in mechanical form.

When we ask whether a business should expand, or whether its stock is a good investment, or whether it can better raise funds by selling stocks or bonds, we are asking a similar sort of question. For the essence of our question is merely: " Where does this business stand in reference to its course of life? " Every business has its rhythms. These rhythms, wrapped around its trend, combine to make a path that can be graphed like an orbit. We can discover these rhythms by analysis, much as we discover the separate rhythms in the tides.

A business is an organ — major or minor — in the whole economy. We should therefore expect to find in it at least one of the major rhythms that we meet in the economy as a whole. We ordinarily do. In addition, we often meet one or more rhythms seemingly unique to that particular business. Why this should be so, we do not yet know.

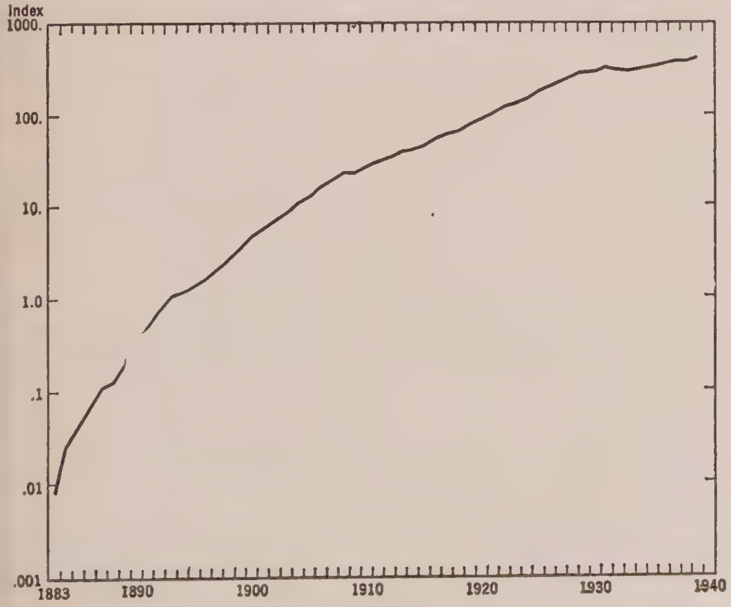

Fig. 1. A Sales Chart

Sales of a Public Utility Company 1883–1939. *Ratio scale.*

An illustration of the sales chart for one business is shown in Fig. 1. The business represented is an important public utility company of the United States. The sales from 1883–1939 in physical units are plotted on logarithmic paper to show rate of growth, in the fashion to which the reader was earlier introduced. It is worth noting, at this point, that this entire plotting and analysis was made in 1940, before the United States became involved in war.

Figure 1 shows us a company that has had a strong and healthy growth — one whose growth is continuing in terms of annual increases in dollars of sales. But the fact that the slope of the line is getting flatter shows that the *rate* of growth is now on the downgrade. The company is rapidly becoming mature. A comparison with some of the charts showing the trends for major American industries, as indicated in the early pages of this book, will show a marked similarity in the trend line. We are, therefore, dealing with a more or less typical major industry.

Nothing that meets the eye of the reader in Fig. 1 suggests any particular rhythm — there are merely some apparently irregular deviations from the trend. But with our knowledge of rhythmic behaviors we know that rhythms in figures are not always readily apparent. If they were, everyone would know all about them. We must look beneath the surface of our data. We learned earlier that calculating the *rate of change* will often reveal a suspected rhythm with great clarity. We therefore calculate the monthly rate of change in this business, using in this instance a 3-year interval.* That is, we use a 3-year moving percentage.

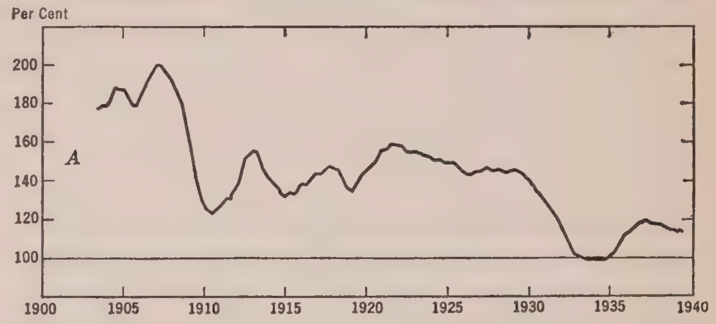

Fig. 2. A Rate of Growth Chart

Rate of growth, 1903–1939, of the Public Utility Company, the sales of which are given in Fig. 1. The curve represents a 3-year moving percentage, and shows the percentage by which sales for each month are above or below those of the corresponding month three years before.

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* The possible treatments of figures to reveal rhythm are exceedingly numerous. They include, beside various moving percentages: (1) deviation of the data from various simple moving average trends; (2) deviation of the data from various weighted moving average trends; (3) deviation of the data from various mathematical trends; (4) deviation of various moving averages of the data from various moving average trends; (5) deviation of various moving averages of the data from various mathematical trends; (6) deviation of one mathematical trend from another; (7) various moving section averages. Al-

Figure 2 shows us the result. If we have not yet revealed a rhythm clear to the eye by simple inspection, at least we have before us a chart that shows wide swings in the rate of change.

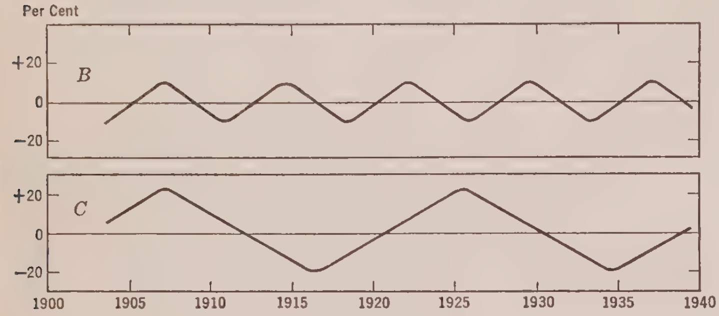

FIG. 3. TWO REGULAR CYCLES

Cycle B has a period (length from high to high or low to low) of 90 months (7½ yrs.). Cycle C has a period of 220 months (18⅓ yrs.).

Our problem now becomes one of analysis. The outcome is the two sets of waves shown in Fig. 3. We have come up with two perfectly regular rhythms — one of 18⅓ years, and the other of 7½ years. They were concealed from us in Fig. 2 because crests and troughs were so combined, at various times, that crests sometimes augmented crests and sometimes tended to wipe out troughs, while troughs sometimes combined to deepen troughs and at other times obscured crests.

But we have not yet finished our task. As one test of our work, we must move from analysis back through synthesis. Figure 4 shows the two rhythms, which were isolated in Fig. 3, recombined into a complex. Figure 4, when compared with Fig. 2, shows a suggestive similarity. Our work, however, is still not finished. We are dealing in this business not only with rhythms, but with a trend. Figure 5 shows this trend — the basic underlying trend in the rate of growth. Here the graph is in terms of per cent. It is decreasing, and our trend line slopes steadily downward to the right.

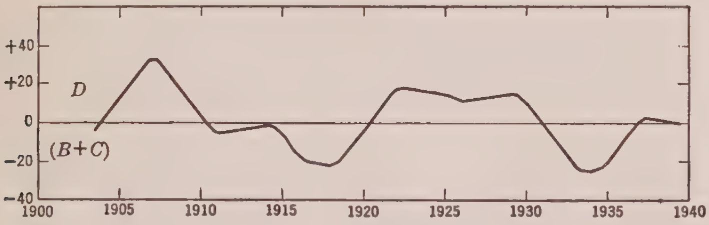

FIG. 4. SYNTHESIS

The 7½-year and the 18⅓-year cycles combined (Curve D = Curve B plus Curve C).

Now, in Fig. 6, the trend line delineated in Fig. 5 is combined with the complex wave, created by synthesis, shown in Fig. 4. The total synthesis gives us something closely approaching the wave we started out with.

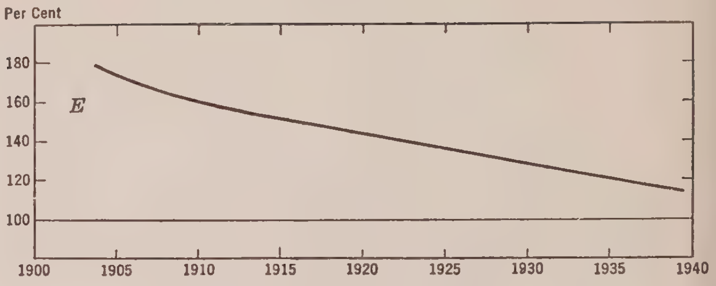

FIG. 5. THE TREND LINE

Trend of the Rate of Growth, as Charted in Fig. 2, of the Public Utility Company, the actual sales of which are charted in Fig. 1. The Company is growing, but at a decreasing *rate*. For a simpler example, refer to the hypothetical company discussed in Chapter 1.

For convenience, Fig. 2 is repeated under the new synthesis in Fig. 6, so that we may make a ready comparison. When the two curves are compared in detail, it is clear that there are certain fluctuations in the true curve of Fig. 2 for which there are no counterparts in Fig. 6. On the whole, however, the comparison is excellent, and conformity is seen to have been especially close in the past twenty years, or since the business has reached maturity. We may therefore assume that we have isolated the *major* rhythms which move along this trend line.

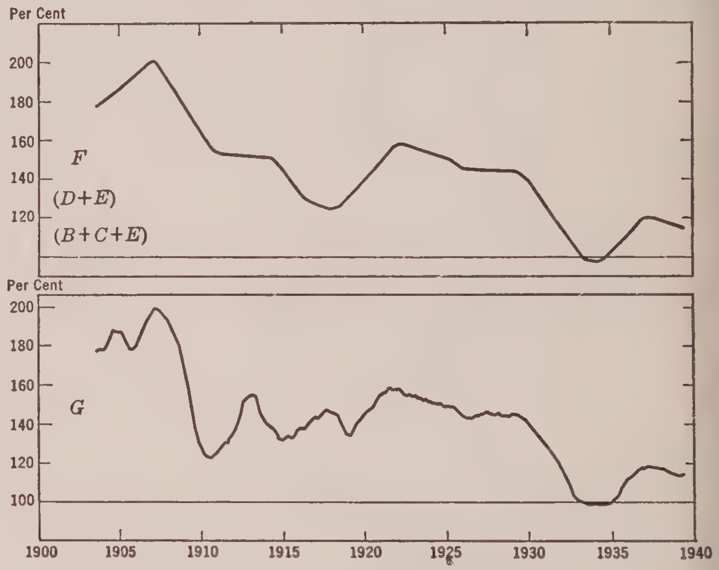

FIG. 6. TREND LINE AND CYCLES

Trend of the Rate of Growth of the Public Utility Company as shown in Fig. 5, plus the combination of the 7½-Year and the 18⅓-Year cycles, as shown in Fig. 4. Curve F = Curve B plus Curve C plus E. For purposes of comparison, curve A is reproduced again and labelled G.

The conformity between our synthesis and the actual curve may be seen better if, for the past twenty years, we draw the derived curve, as shown in Fig. 6, in dotted lines, and place it on the actual curve first shown in Fig. 2. This operation is performed in Fig. 7.

---

though the methods are various, they all have one basic purpose, namely, to subordinate or minimize the irregularities (including rhythms of other lengths) so that a rhythm, if present, can be observed and studied.

The synthesis of the two waves (7½ and 18⅓ years) is projected here for the next twenty years.

Figure 7 shows us, in other words, the application to economic prediction of the same principle that is used in predicting future tides — i.e., the synthesizing of the constituents after they have been isolated in analysis, so that the synthesis may be projected into the future.

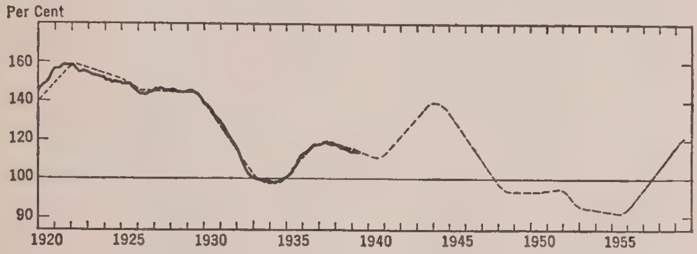

Fig. 7. Projection and Comparison

The 3-Year Moving Percentage, 1920–1939, of the Sales of the Public Utility Company, the actual sales of which are given in Fig. 1 (solid line), together with the Synthesis of (i) the regular 7½-Year Cycle, (ii) the regular 18⅓-Year Cycle, and (iii) the Trend, as shown in Fig. 6 (broken line). The synthesis and trend are projected to 1959, to give an idea of what will happen if the rhythms and the trend continue as in the past.

For this particular company, the projection has been extremely close to the actual curve, as subsequent experience has drawn that curve from 1939 through 1945. The two rhythms on which the projection is based go back as far as the series — 57 years — and pretty well describe the series' behavior, at least since the company has reached its majority. The probability of their continuing seems high, and the unwisdom of ignoring this probability would seem real.

In Figure 8 the rate-of-change projections have been converted back into an actual physical projection. Figure 8, that is, is the final part of Figure 1, enlarged. This particular chart showed that in 1938 and 1939 the plant facilities could be expanded boldly — incidentally, at a time of reasonable costs. It showed that between 1939 and 1946 refinancing should be possible on a most favorable basis, presumably because of satisfactory earning statements of a kind that might not be possible in the following decade when earnings would probably be drifting below 1939 averages. The marked downgrade indicated in the chart after 1946 suggested the wisdom of considering whether earnings should be generously distributed from 1939 to 1946, or whether surplus should be built up to help maintain dividends after the decline sets in.

Clearly, on the basis of the pattern, 1944–1945 were years when no new vice-presidencies should have been created; 1945–1946 were years when new employees should have been taken on slowly, if at all; and 1947–1948 show as years in which employees may have to be weeded out. Certainly our chart tells us that they should not be retained merely in the hope of a revival in sales two or three years later.

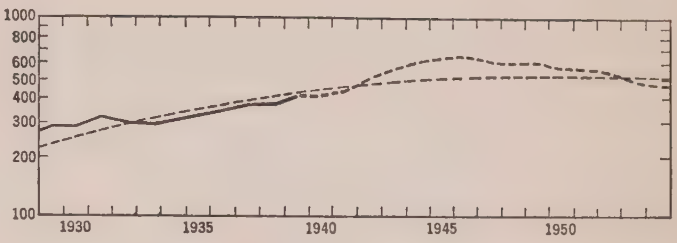

Fig. 8. An Enlargement

Sales of the Public Utility, 1930–1939. (The last ten years of the curve in Fig. 1 are here enlarged.) *Ratio scale.* There have been added the trend, and a projection into the future, based on a conversion of the rate of change figures charted in Fig. 7, to give an idea of what will happen if the rhythms and trend continue as in the past. For a simpler example of the same sort, refer to the hypothetical company in Chapter 1.

After 1946 the company may begin to find itself with some excess plant facilities; undoubtedly, after 1946 has come and gone, and the downturn has definitely established itself, the company should consider scrapping surplus plant and equipment that will not justify carrying charges during the eighteen years or so that they will not be needed. For our chart shows definitely that, if the underlying growth trend for this particular business continues to flatten at the rate of the past twenty years, and if the cycles continue, more than eighteen years will pass before the company will again reach the levels of 1946.

Information of this character can be put to work not only in connection with questions affecting production facilities, financial management, and employment, but in every department of the business: inventory control, purchasing policies, the timing of advertising and sales promotion, and the direction of public relations policies.

Because this particular utility company reflects the operations of a whole community, its own rhythmic activity is closely associated with the community's life. Hence the projection we have drawn for it will apply with not too great a divergence to the economic activity of the entire city in which it operates..

In 1946 this city was enjoying a great real estate boom. Residential rents were under government control, but rents for commercial properties were soaring. Landlords were demanding rental increases of from 100 to 300 per cent from some business tenants, together with new leases running from five years up. The great business activity reflected in the public utility's sales enabled many landlords to get heavy rentals on the long-term leases they demanded, for tenants were desperate. A shortage of loft buildings and other commercial space left no place to move.

But if our chart correctly portrays the future of this community, there will be a great letdown well before the forties have ended, and those with long-term leases at high rentals may have regrets.

Interestingly enough, the 18⅓-year rhythm which has been isolated in the life of this utility company is the one that shows up so clearly in real estate activity — the rhythm that Warren and Pearson have declared the next most important in our economy, after price movements. For it is closely associated with the activity of many basic industries. Whether the 7½-year rhythm, which we find operating beside it in this utility company, exists in other activities of the metropolis where the utility is located is a question which only long study and exploration could answer.

This chart indeed raises more questions than the present state of our knowledge permits us to deal with. For instance, when the projection in Fig. 8 was drawn, it was not known that 1941–1945 would be " war years." But notice the large increase in sales projected for those very years, on the basis of the two rhythms isolated in this company's operations. There is much in the analysis of rhythm to indicate that many rises in prices, sales, and other indices of economic activity come on schedule, war or no war. And declines come similarly. As stated before, war may, and usually does, distort the *amplitude* of a wave — just as a strong wind may sweep a high tide higher — but it often seems to interfere with the *timing* of the wave to a very small degree, if at all.

The projection shown in Fig. 8 warrants a word of warning as regards the war question. Some observers, around 1942, put their finger on the 1946 peak and said, in effect, " Ah, that's when the war is going to end! " There is nothing in our knowledge of rhythms that could warrant this kind of interpretation. It can be hazardous to read such " reasons " into these rhythmic patterns.

The pictures seen in the graphs are inevitably very generalized portrayals of the landscape that lies ahead of us. In this method we have a tool for our journey toward the future, but it is not a key which unlocks all mysteries. The further we go in every science, the more profound the chasms in our knowledge can appear. One such gap faces us when we note the projection for the utility company (as shown on page 179) for the years after 1946. The long decline forecast there agrees very well with the decline in America's national economic activity which the four chief economic rhythms are now forecasting after 1946–1947. But only one of the four national rhythms — the 18⅓-year — is a constituent of the utility company's wave. Why, on the basis of different constituents, the waves for the nation and the one company should be so similar in character is not for answer here.

A similar analysis and synthesis is shown for an industrial company in Figs. 9, 10, and 11. Figure 9 shows adjusted net shipments, 1871–1940; a 3-year moving average has been charted here on ratio ruling, to show change in rate of growth. Figure 10 shows the analysis. We see a 9⅓-year wave (A) ; an 18⅓-year wave (B) ; and an underlying growth trend (D) . The effect of World War I on this company shows in a lift of the growth trend from one level to another. The pattern and the rate of growth were not affected at all. When the company was expanded at this point by the war forces, the trend line merely continued its established course at a somewhat higher level. Figure 11 shows the synthesis of A plus B plus D, projected to 1970, and matches it against the actual data (until 1940) that was first plotted in Fig. 9. It will be noted that the synthesis shows very close correspondence with the actual data, as far as these data go. After 1940 war forces lifted actual shipment figures above the synthesis line, much as in World War I.

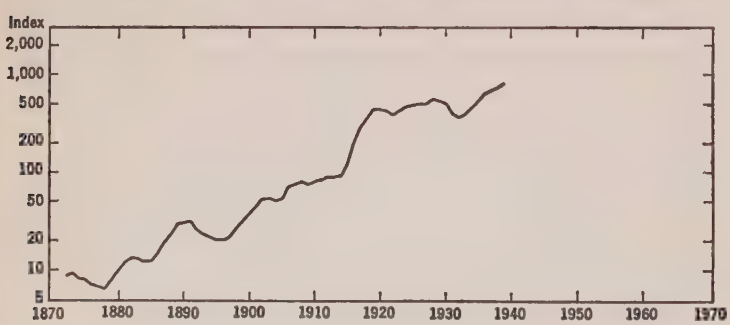

Fig. 9. Sales of an Industrial Company, 1871–1940
Three-year moving average. *Ratio scale.*

The data for another corporation are shown in Figs. 12, 13, 14, 15, 16 and 17. Permission to use the data here has been granted

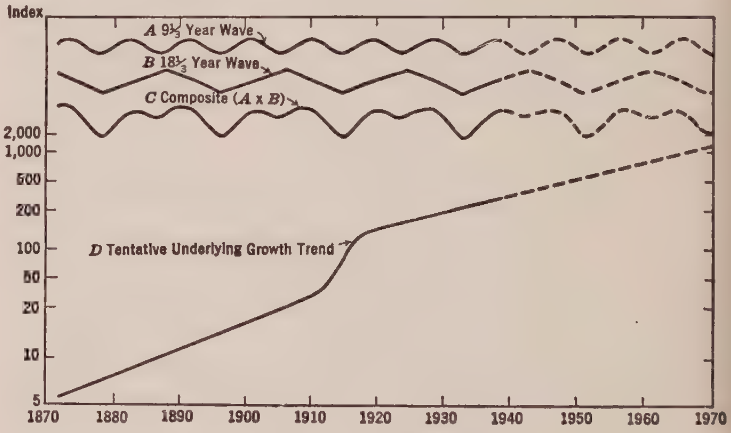

Fig. 10. Analysis

(A) A regular 9⅓-Year Cycle; (B) a regular 18⅓-Year Cycle; (C) the Two Combined; (D) the underlying Growth Trend of the Industrial Company, the actual sales of which are charted in Fig. 9. *Ratio scale.*

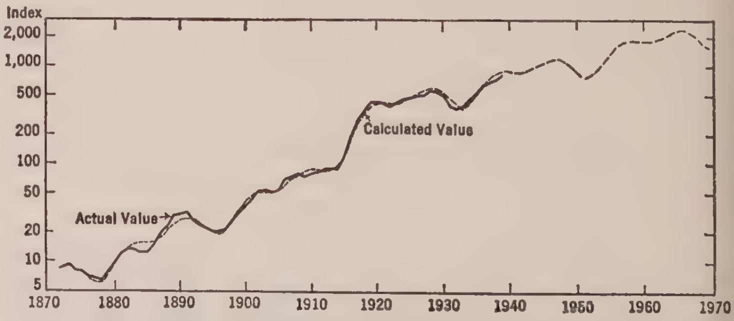

Fig. 11. Synthesis

Sales of an industrial company, 1871–1940 (3-year moving averages), as shown in Fig. 9, together with a synthesis of the regular 9⅓-year cycle, the 18⅓-year cycle, and the underlying growth trend, as shown in Fig. 10. *Ratio scale.* This projection gives an idea of what will happen if the rhythms and the trend continue as in the past.

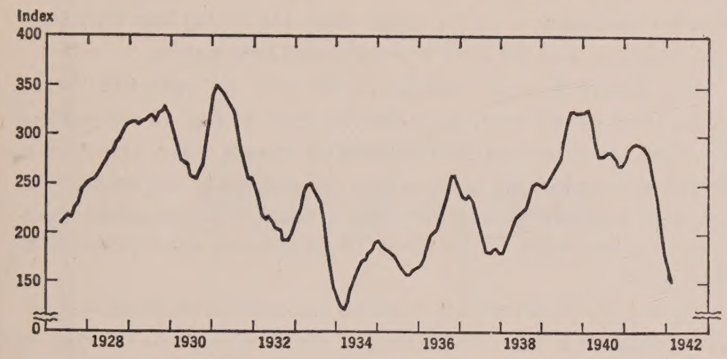

Fig. 12. Sales, 1927–1941, of Another Industrial Company

A 9-month moving average of the data, adjusted for seasonal rhythm.

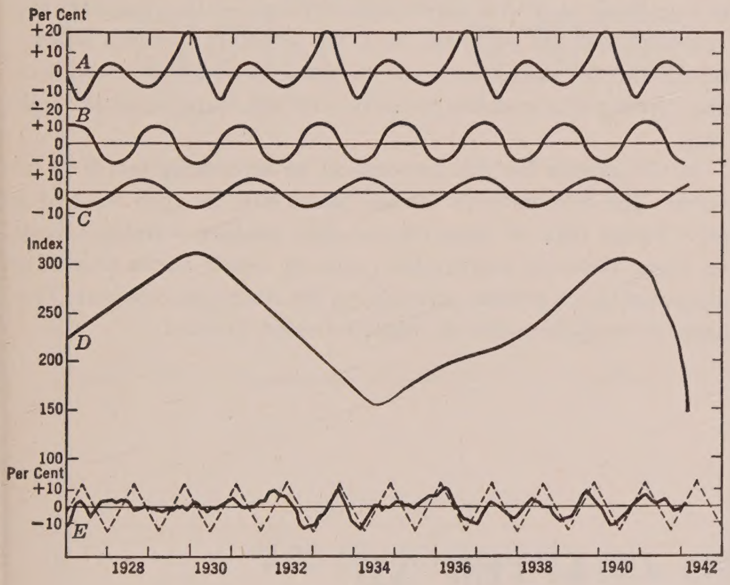

Fig. 13. Analysis

(A) A regular 41-month cycle; (B) a regular 24-month cycle; (C) a regular 33-month cycle: (D) a 10-year wave; (E) residual showing 15-month cycle.

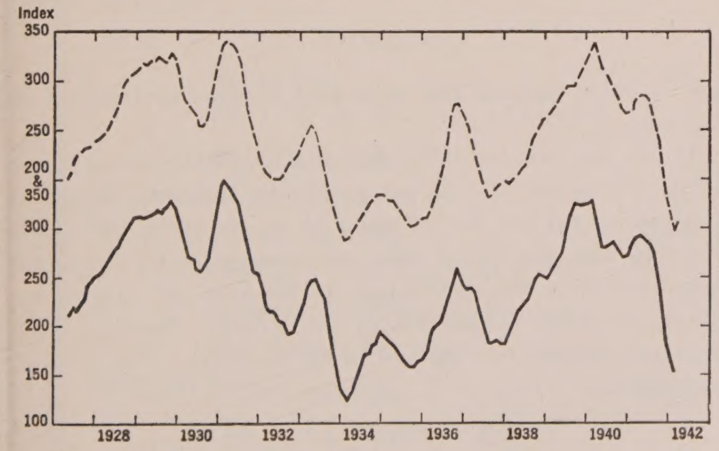

Fig. 14. Synthesis

Above, synthesis of the regular cycles and the 10-year wave, shown in Fig. 13 (dotted line); below, actual sales of this company as shown originally in Fig. 11 (solid line).

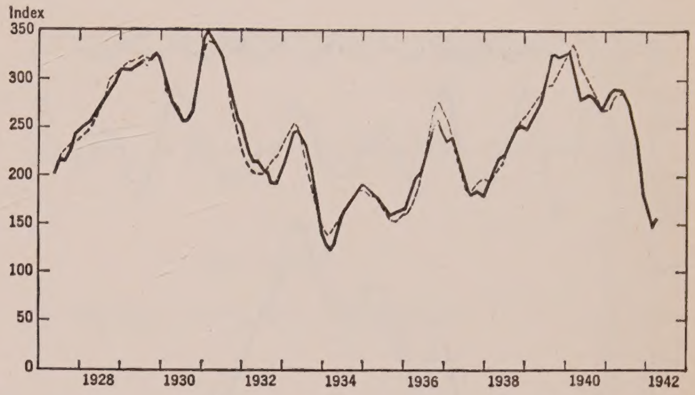

Fig. 15. Comparison

The curves shown in Fig. 14 superimposed.

on the condition that the corporation not be identified even by reference to its field of industrial activity. It may only be said that it is an important organization.

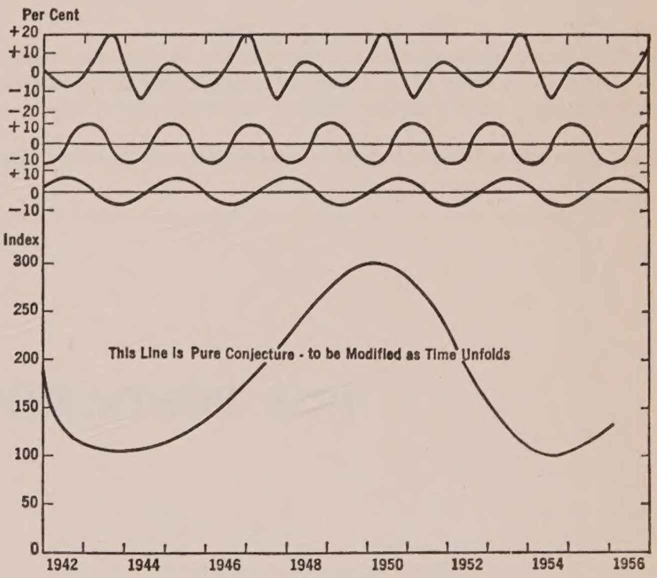

Fig. 16. Projection

The regular cycles shown in Fig. 13 projected into the future to 1957, to show the deflection from trend and from major waves that will take place if the rhythms continue as in the past. The 10-year wave is projected merely as a conjecture.

Figure 12 shows its total United States sales by months, 1927–1941, plotted as a 9-month moving average after adjustment for the 12-month (or seasonal) rhythm. Figure 13 shows the analysis, which produces a 41-month rhythm of a peculiar pattern; a 24-month rhythm; a 33-month rhythm; a 10-year rhythm; and a residual shown at the bottom of the chart as F, where we find strong suggestion of a further rhythm of approximately 15 months.

Figure 14 shows, at the top, the synthesis of these various rhythms, and at the bottom — for easy comparison — the actual line that was first plotted in Fig. 12. The correspondence is close. In Fig. 15 we

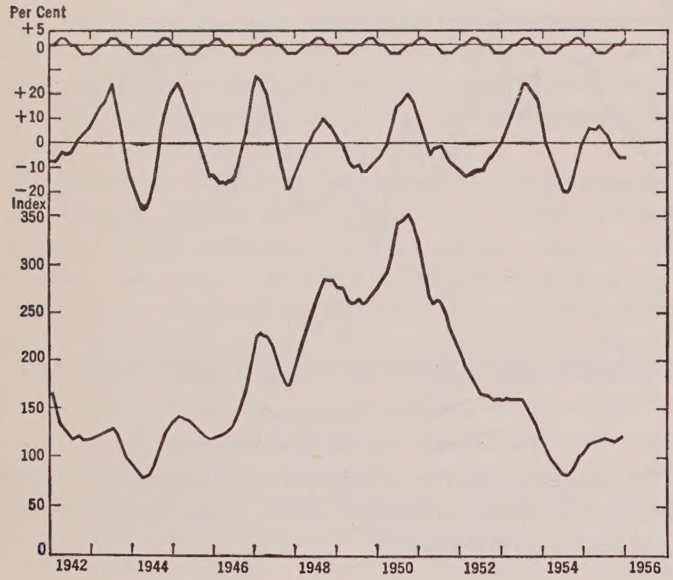

FIG. 17. FINAL SYNTHESIS

Synthesis of the cycles and the wave shown in Fig. 16. Top, the 15-month cycle; middle, the synthesis of the 41-month, 24-month, and 33-month cycles; bottom, synthesis of all four rhythms with the conjectural 10-year wave.

can compare our synthesis and the actual line in another way, since one is superimposed on the other. Here the dotted line represents our synthesis, and the solid line the actual sales figure.

We observe that our synthesis checks very well with the "real" line. Thus we are ready for a further step. In Fig. 16 our various rhythms are projected into 1956. The 10-year wave here is projected as a conjecture, inasmuch as this particular corporation has too short a history (dating back only to 1927) to permit of any opinions as to the reality of this wave. There are only two repetitions to deal with.

Figure 17 now carries the synthesis to a conclusion which — however tentative it must be because of the short span of the data in hand — is still worth the making. In this figure, rhythm A is the 15-month rhythm found in the residual graphed in Fig. 13. Line B is a synthesis of A with three other rhythms — the 41-month, the 24-month, and the 33-month. In C the 4-rhythm synthesis is combined with the conjectured 10-year wave, to obtain a synthesis of five rhythms as a tentative projection for the corporation through 1955.

In the pattern for this corporation an interesting fact is to be noted. The corporation's United States sales in 1930 reached a peak higher than in 1929; they reached another — lesser — peak in 1932. Thus the corporation's pattern clearly varies markedly from that which prevails generally in the American economy. The tentative projection carries this observation forward.

1954 POSTSCRIPT TO CHAPTER XII

IT was not the intention of Chapter XII to tell you how to make a cycle analysis. (Cycle analysis is that branch of statistics which deals with the detection, isolation and evaluation of rhythmic fluctuations in a series (succession) of numbers.)

To make a cycle analysis of a series of numbers, such as the sales of your company or the prices of something in which you are interested, you need first of all to know a good deal about statistics. In addition, you need to know many things that are not contained in any text book of statistics yet written. In other words, to teach you to make a cycle analysis would require another full size book devoted exclusively to this subject.

If you are interested in making a cycle analysis of some series of figures you can get some help from back copies of the magazine *Cycles*. But if you wish to undertake the job in a serious way, you should take the correspondence course now being offered by the Foundation. If you have not already enrolled, write for information to the Director, Research Headquarters, Foundation for the Study of Cycles, East Brady, Pennsylvania.

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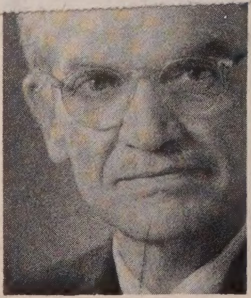

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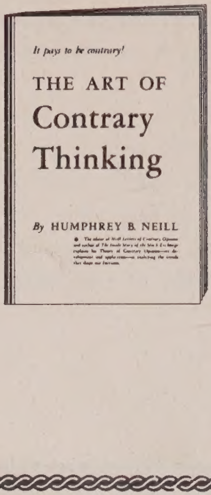

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